The cases treated have practically all been cured, and it is believed that almost all trachoma cases in Mitchell County have been treated. A few cases of the old chronic type of trachoma, which showed a disposition to relapse, were probably not entirely cured. These cases have been turned over to the county health officer for further treatment. The county health officer acted as understudy to the medical officer in charge for some weeks in order that he might learn the proper procedure and treatment in dealing with these cases.

Splendid work was done by the medical officer in charge and the two nurses assisting him. Although on duty practically all the time during the four and one-half months, they were tireless in their efforts and unfailing in their interest and enthusiasm throughout the entire time. They deserve special mention in this connection for faithful, conscientious, and loyal service. It is a pleasure to state that the citizens of the community appreciate their ability and the help given in this piece of public health work.

With appreciation, acknowledgment is made of the thorough cooperation of the State board of health, the county commissioners of Mitchell County, the local physicians, and interested citizens, which made the work possible and assured its success.

TRACING SPECIFIC SOURCES OF RURAL ENDEMIC TYPHOID.

AN EPIDEMIOLOGICAL STUDY OF RURAL TYPHOID FEVER IN TWO COUNTIES OF MARYLAND.

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The evidence gathered in routine epidemiological studies of endemic typhoid fever in rural communities has, in many instances, proved to be so indefinite and disconnected that specific sources of infection for individual cases, and groups of cases, could not be clearly identified. With this fact in mind, a study was inaugurated by the writer in April, 1920, in Washington and Frederick Counties, Md. It was believed that if individual endemic foci could be delimited, and sufficiently detailed data obtained regarding these foci, specific chronic sources of infection might be found with greater ease.

Plotting Foci.

Spot maps were prepared showing the location and year of occurrence of each typhoid case reported to the State department of health from the two counties during the years 1916, 1917, 1918, and 1919 (see maps). These maps showed some striking features in the distribution of cases. In many instances, where decided clumping of cases was noted, it was found that this was due to the occurrence of cases year after year, indicating chronic endemic conditions rather

than transient epidemic ones. Fifteen "communities," or "areas," were then outlined, seven in Washington County and eight in Frederick County (see maps). Each of these areas showed clumping of cases, indicating one or more focal points. In outlining the areas, an effort was made to include focal points apparently bearing some epidemiologic relationship to each other. These areas were not intended, however, to show even approximate equality in size or in population, the boundaries being arbitrarily made on the basis of relationship of apparent foci.

A chronological list of cases was then made for each of the 15 areas, showing the name of each case, its location, and date of occurrence. Later, the name of the householder in each case was added. See list, "Hancock-Pectonville area" (W–1).

A glance at this list and at its corresponding area on the map will show at once the distinct grouping of cases year after year. Comparison of areas in each county will show a like grouping. In other words, these maps seem to show endemic focal areas with rather definite focal points.

Investigation of New Cases.

As new cases were reported, careful case histories were obtained. Focal area lists were found to be of great assistance in the field in reviewing the previous typhoid history of a community and its relation, if any, to a case under investigation. Personal contacts were given closer scrutiny than sources of water supply or sanitary condition of premises.

In taking histories, particular attention was given to the following points:

1. Places at which food or drink had been taken within 30 days previous to onset.
2. Family history of typhoid.
3. History of typhoid in personal contacts.
4. Visitors, within 30 days of onset.
5. Contact, within 30 days of onset, with any cases of illness resembling typhoid.

Places of contact.—Places of contact were designated by three terms: local, foreign, and mixed.

Local contact history was subdivided into two groups: (*a*) One in which food or drink had not been taken outside of the immediate area wherein the patient's home was located, within 30 days of onset; (*b*) one in which food or drink had been taken outside the home area, but not outside the two counties under investigation, within 30 days of onset. Detailed information was obtained as to places away from home where food or drink had been taken; also information regarding personal contact with known or suspected

typhoid cases at such places. Cases giving the first variety of local contact history were, of course, most valuable in indicating local sources of infection.

Cases giving history clearly indicating a source of infection outside of the counties under study were designated as foreign, and were not included in the study.

Cases giving both local and foreign history were designated as mixed. In such cases, contacts were often so numerous and complicated that epidemiologic analysis was rather difficult.

Family history.—Any history of previous typhoid in a member of the family was given careful consideration as to date and history at the time of infection. If a mother, or other person in a home, connected with the preparation of food, gave such a history, or if any past history indicated a mother, or other person, as a possible source of infection for previous cases in the family, this fact was noted. Any history of repeated occurrence of typhoid in the same family, particularly in the absence of typhoid in neighboring families having many community contacts in common, was regarded as evidence of a carrier, either in the immediate family or in a frequent family contact.

History of typhoid in personal contacts.—In investigating a case, the names on the list of previous cases in the area in which the patient lived or had had contact, were discussed with the informant, and, if possible, with the patient, in order to learn if any of the persons enumerated, or members of the families of these persons, had been associated with the patient within 30 days of onset. Similar history for periods previous to 1916, not covered by case reports, was also sought.

Visitors.—This portion of the history applied particularly to persons, especially women, who had, within 30 days of the onset of the disease in the patient, eaten at the family table, or had assisted in the preparation of any meals eaten by the patient.

Contact, within 30 days of onset, with cases of illness resembling typhoid.—This portion of the history was given special attention in cases furnishing no other definitely suspicious history. If the history produced information indicating personal contact, or contacts, as a probable source of infection, careful inquiry was made as to history of typhoid, or suspected typhoid, in such a contact, also the presence of chronic abdominal trouble, and history of typhoid in his or her associates since the time of an attack. If facts in connection with the history seemed to justify it, feces and urine cultures were obtained to determine the presence, or absence, of typhoid or paratyphoid bacilli.

Record was made of all personal contact suspects for reference in investigation of future cases, giving history of contacts in the areas where the suspects lived. (See Sample Typhoid Case Histories.)

Epidemiologic Findings.

From April 1, 1920, to December 31, 1920, 63 cases of rural [1] typhoid were investigated according to the foregoing method.[2] Six cases gave histories indicating that infection had occurred outside the two counties under study. Four of these were imported after the onset of symptoms. The remaining 57 cases furnished data indicating that infection had been contracted locally.

TABLE I.—*Classification of cases according to probable source of infection.*

Probable source.	Number of cases.	Per cent of total.
Contact with reported cases	2	3.5
Contact with unrecognized cases	11	19.3
Contact with demonstrated carriers	19	33.3
Contact with specifically located sources	32	56.1
Probable source unknown	25	43.9
Total	57	100.0

Local sources of infection specifically located.—Thirty-two of the 57 cases, or 56.1 per cent, gave history of contact with specifically located sources (see Table I).

Two cases gave history of direct contact, within 30 days of onset, with a previously reported convalescent case in the immediate family; and 11 reported cases gave history of direct contact, within 30 days of onset, with an unreported suspected case. Nine of these 11 cases had eaten at the same table with a suspected case during the period of convalescence.

In connection with the investigation of this group of cases, 7 suspected cases were found in which the clinical history and findings seemed to warrant a diagnosis of typhoid. None of these had been reported. Prophylactic measures had been taken in only two instances.

Nineteen cases gave history of direct contact with a demonstrated carrier. Ten carriers were demonstrated during the study (see Table II). Feces and urine cultures were obtained from 28 suspects, with 18 negative results. Bacteriological examinations were made by Dr. R. C. Salter, State bacteriologist of Maryland, and confirmed by the Hygienic Laboratory of the United States Public Health Service at Washington, D. C. Organisms identified by cultural methods were, in all instances, confirmed by agglutination.

Without exception, the above 19 cases gave a history of direct contact with a bacteriologically demonstrated carrier within 30 days previous to onset, and in 14 instances the case lived in the same

[1] Cases occurring in towns and villages of over 600 population were not considered rural.

[2] Exclusive of a water-borne outbreak of 22 cases which occurred at Security, Washington County, during November, 1920.

house with the carrier and repeatedly ate at the same table, within a like period. In 8 cases a carrier had helped in the preparation of food eaten by the patient, within 30 days of onset.

Local sources of infection not specifically located.—Twenty-five cases, or 43.9 per cent, did not give history of contact with specifically located sources.

Contact with transients: Two of these cases had, however, been employed at "fruit-picking" camps where many transients were employed, where sanitary precautions were not the best, and where there were opportunities for contact which could not be specifically located.

Contact with suspected carriers: In six cases, contact with a carrier was the suspected source of infection, but no positive culture could be shown in any suspected personal contact.

Polluted drinking water: The history obtained in seven cases indicated polluted drinking water as a possible source of infection. In none of these, however, could other possibilities be excluded with sufficient clearness to consider drinking water as the probable source of infection.

Doubtful diagnosis: Of four reported cases in which the diagnosis seemed doubtful, two developed symptoms within 10 days after a major abdominal operation. If the diagnosis were correct, it would seem, from the history obtained, that it was more likely that these patients were infected in the hospital on account of faulty antityphoid precautions, than that infection had occurred previous to entry into the hospital. Both had a positive Widal reaction.

In another case, a child convalescing from whooping cough developed an elevation of temperature and some abdominal symptoms. It was diagnosed and reported as typhoid. A few days later this child passed a large number of round worms. The temperature then subsided. No Widal test was made in this case.

The remaining case had an elevation of temperature which lasted for five days. A positive Widal reaction was obtained. The attending physician stated that he did not believe that the clinical symptomatology justified a diagnosis of typhoid fever, but that the case had been reported on the basis of the positive Widal reaction.

Carriers and Endemic Foci.

The potential relation of a carrier to an endemic focus of typhoid is rather clearly suggested in the case of carrier No. 7,[3] living near Millstone, Washington County. This woman, the wife of a rural storekeeper, had assisted her husband in the store for the past four years. During the summer months of each year, ice cream was sold at this store each Saturday afternoon and evening. The carrier

[3] See sample history No. 1.

usually served the ice cream and attended to the washing of the dishes and other utensils used. As this store is patronized by practically all of the residents in the Pectonville district, it seems distinctly possible that the woman has played some part in the causation of this focus. (See map of Washington County.)

In the Bolivar area in Frederick County, 32 cases of typhoid were reported during the five-year period 1916-1920. Ten of these cases were in persons repeatedly associated with carrier No. 10.[4] Seven of these persons were relatives of the carrier.

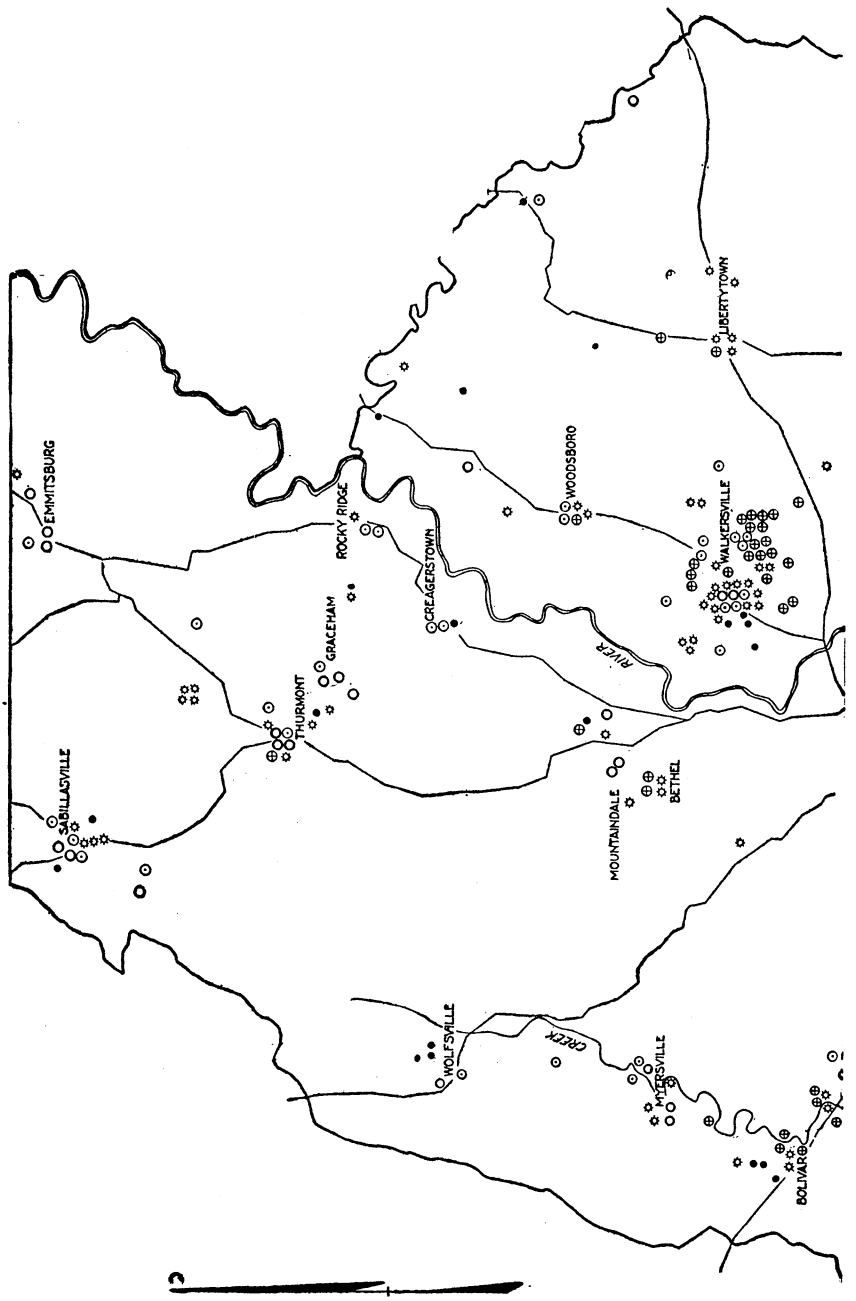
The case of carrier No. 9,[5] living at Security, Washington County, also shows some rather interesting details. The focal list for this area shows the occurrence of four cases of typhoid at Security[6] during the four-year period—one in 1916, two in 1917, and one in 1918. All of these cases were colored men living at Security and employed at the Security cement mill, one being a cousin of the carrier who frequently ate meals at the carrier's home. As the colored population of Security is only 10 per cent of the whole population and lives in a segregated part of the village, it seemed somewhat significant that all of the cases appearing on the focal list should be colored men. In 1920, out of 32 cases of typhoid occurring at Security (of which 22 were considered to be water borne), only three were colored. Two of these three were stepsons of the carrier, living at the same house and eating at the same table. For three years previously this carrier had been a vender, selling cuts of pies and cakes, purchased from a Hagerstown bakery, to workmen at the Security mill. It is understood that much of his patronage was from the colored workmen.

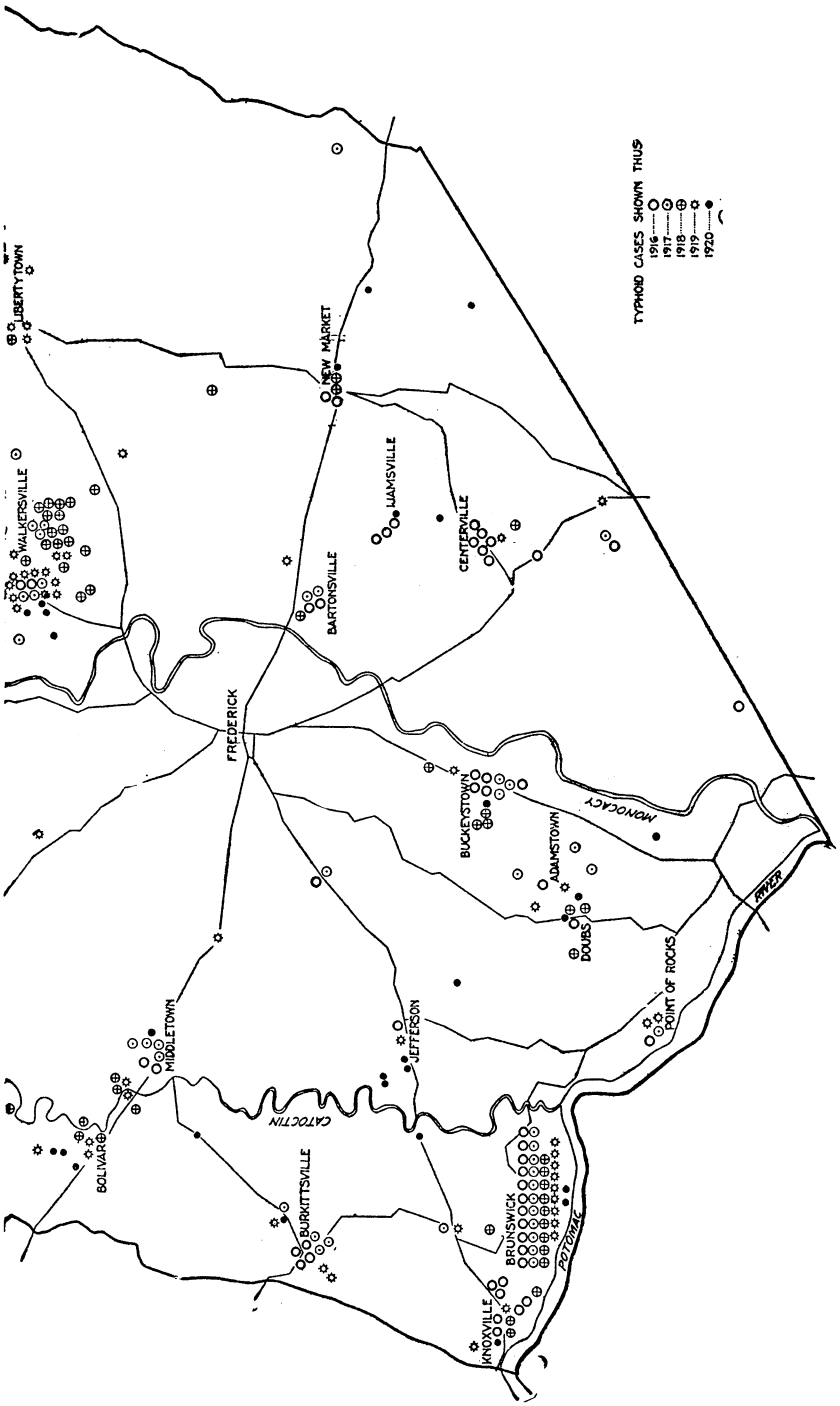
As the study progressed and focal data accummulated, the important rôle of carriers in the causation of foci became increasingly evident.

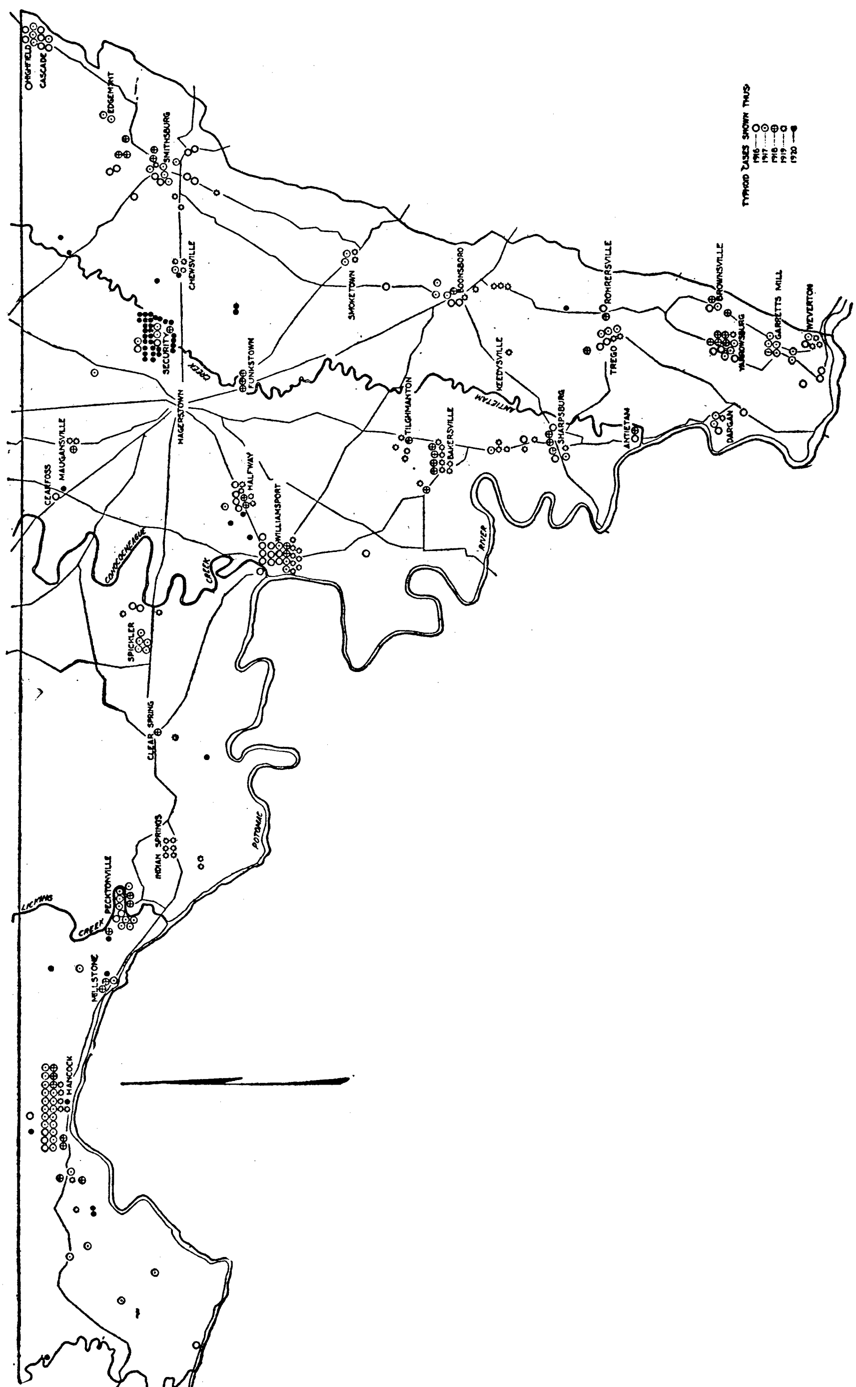
TABLE II.—*List of carriers.*

No.	Age.	Sex.	Color.	Organism in feces.	Organism in urine.	History of previous typhoid.	Number of cases traceable in 1920.
1	43	F.	W.	B. typhosus		[a] 1903	2
2	38	F.	W.	do		1917	3
3	36	F.	W.	do	B. typhosus	1919	1
4	45	M.	W.	B. paratyphosus B		None.	4
5	5	M.	W.		B. paratyphosus B	[b] 1920	3
6	41	F.	W.		do	None.	1
7	30	F.	W.	B. typhosus		1912	1
8	26	F.	W.	do	B. typhosus	1913	1
9	48	M.	C.	B. paratyphosus B [c]		1903	2
10	43	F.	W.	B. paratyphosus B		None.	1

[a] Seventeen cases traceable since 1903. Most of these in West Virginia, the former residence of the carrier, who, at the time this report was made, was a resident of Cumberland, Md.
[b] Suspicious history in April, 1920; culture obtained Aug. 10, 1920.
[c] B. paratyphosus A according to diagnosis at the Hygienic Laboratory of the U. S. Public Health Service.
[4] See sample history No. 4.
[5] See sample history No. 3.
[6] Estimated population 200 to 300 (variable).


EMMITSBURG
ROCKY RIDGE
CREAGERSTOWN
GRACEHAM
THURMONT
SABILLASVILLE
WOODSBORO
WALKERSVILLE
LIBERTYTOWN
MOUNTAINDALE
BETHEL
WOLFSVILLE
MYERSVILLE
BOLIVAR
RIVER
CREEK


TYPHOID CASES SHOWN THUS
1916
1917
1918
1919
1920
LIBERTYTOWN
WALKERSVILLE
NEW MARKET
LAMSVILLE
CENTERVILLE
BARTONSVILLE
FREDERICK
BUCKEYSTOWN
ADAMSTOWN
DOUBS
MONOCACY
POINT OF ROCKS
POTOMAC
RIVER
MIDDLETOWN
JEFFERSON
CATOCTIN
BOLIVAR
BURKITTSVILLE
BRUNSWICK
KNOXVILLE


TYPHOID CASES SHOWN THUS:
1916
1917
1918
1919
1920
CASCADE
EDGEMONT
SMITHSBURG
CHEWSVILLE
SMOKETOWN
BOONSBORO
ROHRERSVILLE
BROWNSVILLE
GARRETTS MILL
WEVERTON
TREGO
KEEDYSVILLE
SHARPSBURG
ANTIETAM
DARGAN
TILGHMANTON
BAKERSVILLE
SECURITY
FUNKSTOWN
HAGERSTOWN
MAUGANSVILLE
CEARFOSS
HALFWAY
WILLIAMSPORT
SPICKLER
CLEAR SPRING
INDIAN SPRINGS
PECKTONVILLE
MILLSTONE
HANCOCK
POTOMAC
RIVER
CREEK

Carriers and Extra Focal Infection.

The possible relation of carriers to the occurrence of typhoid at more or less distant points, is worthy of mention. Five of the carriers found, Nos. 1, 2, 3, 6, and 10, were directly associated with the production of milk on farms from which milk was shipped to distant points each day. In four instances the milk was pasteurized before consumption. As far as could be learned, no milk outbreaks had occurred during the year 1920 traceable to any of these supplies.

Three other carriers, Nos. 4, 5, and 9, live on the watershed of a stream used as a source of water supply for a city whose population is 28,096. All three live less than a mile from the stream, and less than a mile above the point of intake of the public water supply. This water, however, is carefully filtered and chlorinated before consumption, but any interruption of such treatment would open up a channel of infection continuously subject to the possibility of fresh pollution close at hand. In past years this city has had a relatively high typhoid rate, but pollution of the water supply by these carriers, as a factor in the causation of this high typhoid rate, is a matter of conjecture.

Conclusions.

This study would seem to indicate direct contact with bacteriologically demonstrable typhoid carriers as the most prolific source of endemic rural typhoid, and direct contact with unrecognized cases as the next most important source.

The endemic typhoid history of the two counties studied, in former years, as indicated by focal lists, apparently shows a higher percentage of cases secondary to contact with reported cases during the active and convalescent stages, than was found in the cases for the year 1920.

It seems probable that if it could be shown that over 50 per cent of the group of typhoid cases studied had dangerous contact with demonstrated carriers, or with unrecognized clinical cases, there must have been additional cases who had such contact not brought out in the history obtained.

It is believed that the above experience is not unusual in the counties studied. In areas where carriers were found, the relationship of the carriers to cases reported in previous years seemed strongly to suggest carrier infection. It therefore does not seem to be an exaggeration to state that probably more than 30 per cent of cases of endemic rural typhoid fever reported each year in these counties are traceable to contact with chronic carriers, and more than 20 per cent to contact with unrecognized cases. It may be that such a conclusion has a very much wider geographic application. If this is

found to be true, the demonstration of carriers, as well as practical measures for the prevention of the spread of typhoid by carriers, should receive more careful consideration than has been given in the past. Better notification in suspected cases, with prompt institution of prophylactic measures, would also seem to be an important factor in the control of rural typhoid.

Polluted rural water supplies and insanitary privy conditions were not shown to be a prominent factor in the causation of this group of cases. This may be due to the fact that cases associated with demonstrable sources of infection gave history of direct contact with these sources. Six of the ten carriers demonstrated lived in homes provided with protected water supplies and sanitary privies or closets. Protection of water supplies and sanitation of privies are, no doubt, extremely important antityphoid measures which should be carried out with all vigor in rural communities, but it may be that these measures do not play as large a part in the prevention of endemic rural typhoid as has been believed.

The method of investigation outlined shows many opportunities for refinement and extension. Its simplicity, however, permits its trial by county health officers and other field investigators in rural communities in connection with routine typhoid work.

Appendix.

Typhoid list, Hancock, Pectonville area (W-1).

1916.

Name.	Address.	Date.	Householder.
Harry A.[1]	Hancock	August	Harry A.
John B	Pearre	September	John B.
Leo C	Hancock, R. D	do	Leo C.
Perry D	Hancock	October	Perry D.
Katherine E	do	do	E. E.
Mrs. H. F	Pectonville	do	Harry F.
Daisy F	do	November	Harry F.

1917.

Sallie G	Pectonville	January	Garrett G.
Harry F	do	do	Harry F.
Louisa F	do	do	Harry F.
Katie H	Hancock	March	Levi H.
Willard G	Millstone	April	Daniel G.
Roy J	Hancock	May	Mrs. S. J.
Mrs. Benj. K	do	June	Mrs. Benj. K.
Jesse L	do	do	W. G. L.
Marshall M	Long Hollow	do	T. G. M.
Dorothy N	Pectonville	August	F. E. N.
Lena G	do	do	Harry G.
Maryanne O	Hancock	do	Roy O.
Mary P	do	do	L. E. P.
Mrs. Nevin Q	Pectonville	September	Mr. Nevin Q.
Mary R	do	do	Geo. R.
Geo. S	Hancock	do	Geo. S.
Wm. R	Pectonville	October	Lucy R.
Chas. T	Hancock	do	Chas. T.
Mabel U	Exline	do	Thos. U.

[1] The letters (A, B, C, AA, BB, CC, etc.) used in lieu of surnames are not initial letters but are arbitrarily assigned, each letter or letter-combination signifying a particular surname. Where the same letter recurs in the list, reference to the householder will show whether the successive cases are in the same household or in different households having the same name.

Typhoid list, Hancock, Pectonville area (W-1)—Continued.

1917.

Name.	Address.	Date.	Householder.
Mrs. Lucy V.	Tonoloway Orchard.	October...	Mrs. Lucy V.
Albert W.	Hancock	...do.....	Albert W.
Alice X.	.....do.....	...do.....	Frank X.
Francis Y.	.....do.....	...do.....	Jean Y.
Earl Z.	.....do.[1]	...do.....	Scott X.
M. A. F. X.	.....do.....	...do.....	C. W. X.
Gregory Y.	.....do.....	...do.....	Jean Y.
Mrs. R. M. AA.	.....do.....	November	R. M. AA.
Richard BB.	Millstone, R. D.	...do.....	Richard BB.
John CC.	Hancock, R. D.	...do.....	John CC.
Jas. DD.	Hancock	...do.....	Grant DD.
Mrs. Clayton EE.	.....do.....	...do.....	Clayton EE.

1918.

Nervy FF.	Millstone	February..	Joseph FF.
Lynwood V.	Hancock, R. D.	August....	Mrs. Dennis V.
Mamie GG.	Pectonville, R. D.	...do.....	Edward GG.
Mrs. Casin HH.	Pectonville	September	Ed. HH.
R. A.	Hancock	...do.....	Wm. A.
Allen JJ.	.....do.....	...do.....	Allen JJ.
Nellie KK.	Pectonville	October...	Thomas KK.
Brook LL.	Hancock	...do.....	Rev. W. B. LL.
Rosella EE.	.....do.....	...do.....	Wm. C. EE.
Leona MM.	Hancock, R. D.	November.	Harry MM.
Esther NN.	Millstone	December.	Dallis NN.
Milton OO.	Hancock	...do.....	Milton OO.

1919.

Jack PP.	Hancock	February..	Jack PP.
Marvin QQ.	Big Pool, R. D.	July.....	Marvin QQ.
Viola QQ.	.....do.....	...do.....	Do.
Chas. E. RR.	Indian Spring	...do.....	Chas. E. RR.
Lillie G.	Hancock	August....	Claude C. G.
Aubrey W. SS.	Hancock, R. D.	...do.....	S. C. SS.
Virginia SS.	Hancock	September	H. C. SS.
Lesla TT.	Indian Spring	...do.....	Bruce TT.
Paul UU.	.....do.....	October...	V. C. UU.
Ruby UU.	.....do.....	...do.....	Do.
Samuel VV.	.....do.....	...do.....	John VV.
Rose V. XX.	Hancock, R. D.	...do.....	Guy XX.
John YY.	Hancock	...do.....	John YY.
John ZZ.	.....do.....	November.	John ZZ.
Catherine VV.	Indian Spring	December.	Mrs. S. E. VV.

[1] Four miles west of Hancock.

SAMPLE TYPHOID CASE HISTORIES.

SAMPLE HISTORY NO. 1.

COUNTY: Washington. ADDRESS: Millstone.
FOCAL AREA: W-1. DATE OF INVESTIGATION: Sept. 28, 1920.
NAME OF HOUSEHOLDER: Frank W. OCCUPATION: Storekeeper.
NAME OF PATIENT: Catherine W. OCCUPATION: None; at home.
AGE: 7. SEX: Female. COLOR: White. DATE OF ONSET: September 21, 1920.
NO. IN FAMILY: 4. ADULTS: 2. CHILDREN: 2. OTHER CASES IN FAMILY? No.
MILK BOUGHT: Geo. W. (father of Mr. W., Millstone, R. D.) USED BY PATIENT? Yes, as beverage.
MILK SOLD: None. BUTTER SOLD: None.
WATER SUPPLY: Dug well. ANALYSIS: None. RESULT: .....
PROTECTED FROM SURFACE DRAINAGE? Yes.
SEWAGE DISPOSAL: Privy, "E" type. CONDITION: Fair.
DISTANCE OF WATER SUPPLY FROM PRIVY: 75 ft. DRAINAGE: ~~Towards.~~ Away.
DISTANCE OF WATER SUPPLY FROM BARNYARD: No barnyard.
PROPHYLAXIS: Hospital. Nurse. Bedroom. Immunization of family.
EXCRETA DISINFECTED? Yes. DISPOSAL: Buried.

CASE HISTORY.

EVER IMMUNIZED? No.
PREVIOUS TYPHOID? No.
WIDAL: Positive. BLOOD CULTURE: None taken.
PLACES OF CONTACT WITHIN 30 DAYS OF ONSET: LOCAL—Only at Millstone; visited only one house, that of the McC. family, one-fourth mile away; no meal eaten there. FOREIGN—Visited Washington, D. C., with mother, father, and sister on Sept. 1, 1920; stayed only a few hours; went by automobile and took lunch along; purchased bananas and coca-cola at fruit stand in Washington, exact location unknown. Did not visit anyone and ate no meals except lunch prepared at Millstone before departure.
FAMILY HISTORY: Mother had severe attack of typhoid in 1912, followed by abscess in her "side;" had frequent attacks of abdominal trouble with pain in right side. No other typhoid history.
HISTORY OF TYPHOID IN PERSONAL CONTACTS: There was no history of contact within 30 days of onset with any person on the focal list, or otherwise known to have had typhoid, or the members of the family of any such person, with the exception of the mother.
VISITORS: The only visitor eating a meal at the W. home was the patient's grandfather, Henry H., who has never had typhoid. The only other visitors were the McC. children, playmates of the W. children.
CONTACT WITH UNREPORTED CASES; Lucille W., age 12, sister of the patient, was sick for about one week, Sept. 19 to 26. The attending physician thought she might be developing typhoid, but her symptoms cleared up on Sept. 26. At about the same time two of the McC. children had similar symptoms. Mrs. W. attributed all of the cases to bathing in the C. & O. Canal near by, as the children were wading or bathing there almost every day. (All cases probably primary—three suspected cases and one positive case.)
SUSPECTED SOURCES: Mrs. W. suspected carrier;[1] C. & O. Canal polluted water.

SAMPLE HISTORY NO. 2.

COUNTY: Frederick. ADDRESS: Jefferson R. D.
FOCAL AREA: F-3. DATE OF INVESTIGATION: Apr. 19, 1920.
NAME OF HOUSEHOLDER: J. I. L. OCCUPATION: Dairy farmer.
NAME OF PATIENT: Wm. L. OCCUPATION: School boy.
AGE: 7. SEX: Male. COLOR: White. DATE OF ONSET: April 8, 1920.
NO. IN FAMILY: 4. ADULTS: 2. CHILDREN: 2. OTHER CASES IN FAMILY? Yes, one—Flossie S., age 16, colored domestic; onset April 2, 1920.
MILK BOUGHT: None, home supply. USED BY PATIENT? Yes, as beverage.
MILK SOLD: Washington, D. C., through Chapin-Sacks Creamery, Buckeystown. BUTTER SOLD: None.
WATER SUPPLY: Dug well. ANALYSIS: Yes. RESULT: Slightly polluted.
PROTECTED FROM SURFACE DRAINAGE? Yes.
SEWAGE DISPOSAL: A type sanitary can privy. CONDITION: Good.
DISTANCE OF WATER SUPPLY FROM PRIVY: 150 ft. DRAINAGE: ~~Towards.~~ Away.
DISTANCE OF WATER SUPPLY FROM BARNYARD: 300 ft. DRAINAGE: ~~Towards.~~ Away.
PROPHYLAXIS: ~~Hospital~~ Nurse. Bedroom. Immunization of family.
EXCRETA DISINFECTED? Yes. DISPOSAL: Buried.

CASE HISTORY.

EVER IMMUNIZED? No.
PREVIOUS TYPHOID? No.
WIDAL: Positive. BLOOD CULTURE: None taken.
PLACES OF CONTACT WITHIN 30 DAYS OF ONSET: LOCAL—Only at home and at school; carried lunch to school; drank water there. FOREIGN: None.
FAMILY HISTORY: No previous typhoid.
HISTORY OF TYPHOID IN PERSONAL CONTACTS: None, except colored domestic mentioned above who prepared meals while sick; focal list showed no case in this section of F-3.
VISITORS: On March 9 an aunt of patient, Mrs. Susan S., living at Cumberland, Md., arrived for a visit. She stayed until March 20, helping to prepare meals. Informant did not know of any history of typhoid in the aunt.
CONTACT WITH UNREPORTED CASES: On March 19 the father of the patient went to the hospital for an operation for bladder stone; he had no typhoid symptoms as far as could be learned. No other history.
SUSPECTED SOURCES: Mrs. Susan S., suspected carrier (also source for Flossie S.[2]); Flossie S., colored domestic (infectious before onset on Apr. 1? Short incubation in second case?); polluted water.

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[1] Feces culture showed *B. typhosus* (carrier No. 7).

[2] Health officer of Cumberland, Md., was requested to obtain feces and urine cultures on Mrs. Susan S. Feces culture showed *B. typhosus*. Also obtained history of suspected typhoid in 1903. Seventeen cases of typhoid have occurred in her family and persons boarding with her since 1903, most of these in Romney, W Va. (carrier no. 1).

SAMPLE HISTORY NO. 3.

COUNTY: Washington. ADDRESS: Security.
FOCAL AREA: W-6. DATE OF INVESTIGATION: November 15, 1920.
NAME OF HOUSEHOLDER: Jas. D. OCCUPATION: Pie vender.
NAME OF PATIENT: Mansfield S. OCCUPATION: Cement mill laborer.
AGE: 19. SEX: Male. COLOR: Colored. DATE OF ONSET: November 1, 1920.
NO. IN FAMILY: 7. ADULTS: 4. CHILDREN: 3. OTHER CASES IN FAMILY? No.
MILK BOUGHT: S. dairy, Bridgeport Rd. USED BY PATIENT? Only in coffee.
MILK SOLD: None. BUTTER SOLD: None.
WATER SUPPLY: Public supply, Security. ANALYSIS: None. RESULT: .....
PROTECTED FROM SURFACE DRAINAGE: .....
SEWAGE DISPOSAL: "A" type concrete pit sanitary privy. CONDITION: Good.
DISTANCE OF WATER SUPPLY FROM PRIVY: ..... DRAINAGE: Towards. Away.
DISTANCE OF WATER SUPPLY FROM BARNYARD: ..... DRAINAGE: Towards. Away.
PROPHYLAXIS: Hospital. ~~Nurse.~~ ~~Bedroom.~~ Immunization of family.
EXCRETA DISINFECTED: Yes, at hospital. DISPOSAL: Sewer at hospital.

CASE HISTORY.

EVER IMMUNIZED? No.
PREVIOUS TYPHOID? No.
WIDAL: Positive. BLOOD CULTURE: None.
PLACES OF CONTACT WITHIN 30 DAYS OF ONSET: LOCAL—Only at Security and Hagerstown; ate no meals except at home at Security; drinking water while at work—Security public supply.
FOREIGN: None.
FAMILY HISTORY: Stepfather, age 48, had typhoid in 1903; for years after had some chronic abdominal trouble which he thought was "kidney trouble." Has not noticed this trouble for the past two years. Brother, James S., age 19, laborer at cement mill, had typhoid in June, 1920.
HISTORY OF TYPHOID IN PERSONAL CONTACTS: The focal list shows four cases for Security for the years 1916–1919, all four colored; all have been associates of the family of the patient, and one a cousin of the stepfather. None of these four old cases lives at Security now. (Only about 10 per cent of the population of Security is colored.) During April, May, June, and July, 1920, 8 cases occurred at Security—7 white, and 1 colored (James S.). Two carriers, an Italian laborer and his son, were found in close association with these cases and were considered to be the sources of infection. From October 26 to December 2, 1920, an outbreak of 23 cases occurred at Security. This was attributed to an unwarranted reduction in the treatment of the public water supply. Mansfield S. was one of the two colored cases in this group.
VISITORS: No history.
CONTACT WITH UNREPORTED CASES: No history.
SUSPECTED SOURCES: Security water supply; James D., suspected carrier.[3]

SAMPLE HISTORY NO. 4.

COUNTY: Frederick. ADDRESS: Middletown, R. D.
FOCAL AREA: F-2. DATE OF INVESTIGATION: December 20, 1920
NAME OF HOUSEHOLDER: Foster A. OCCUPATION: Dairy farmer.
NAME OF PATIENT: Frances A. OCCUPATION: School girl.
AGE: 9. SEX: Female. COLOR: White. DATE OF ONSET: November 30, 1920.
NO. IN FAMILY: 11. ADULTS: 2. CHILDREN: 9. OTHER CASES IN FAMILY: No.
MILK BOUGHT: None, home supply. USED BY PATIENT? Yes, as a beverage.
MILK SOLD: Yes: S Creamery, Middletown, Md. BUTTER SOLD: No.
WATER SUPPLY: Spring. ANALYSIS: None. RESULT: .....
PROTECTED FROM SURFACE DRAINAGE: Yes.
SEWAGE DISPOSAL: "D" type privy. CONDITION: Good.
DISTANCE OF WATER SUPPLY FROM PRIVY: 150 feet. DRAINAGE: ~~Towards.~~ Away.
DISTANCE OF WATER SUPPLY FROM BARNYARD: 400 feet. DRAINAGE: ~~Towards.~~ Away.
PROPHYLAXIS: ~~Hospital.~~ ~~Nurse.~~ Bedroom. ~~Immunization of family.~~
EXCRETA DISINFECTED: Yes. DISPOSAL: Buried.

CASE HISTORY.

EVER IMMUNIZED? No.
PREVIOUS TYPHOID? No.
WIDAL: None taken. BLOOD CULTURE: None taken.
PLACES OF CONTACT WITHIN 30 DAYS OF ONSET: LOCAL—Only at home and at school, about 1 mile from home; carried lunch to school; drank water there obtained from the farm of Joseph R. Case of typhoid in a child on the R farm, September 19, 1919, none since; no other cases at school. FOREIGN—None.

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[3] Feces culture showed *B. paratyphosus Beta* (carrier No. 9).

FAMILY HISTORY: No previous typhoid in the immediate family; mother of patient has had frequent gall stone attacks for six or seven years. The focal list shows the following cases of typhoid in associates and relatives of the family in previous years: 1917—A minister, Wm. H., and Mrs. E. S., an aunt of the patient, both frequent visitors. 1918—Kate S., an aunt of the patient, and her housekeeper, Mary C. (see VISITORS), also Walter C., employed at the creamery of C. M. S., where the patient's father sells his milk; all associates of the A family. 1919—James S. and Mrs. F. S., aunt and uncle of the patient. 1920—C. M. S., creameryman, cousin of the patient, and Earl P., a cousin. (Contact of these cases with the A family could not be definitely shown to have occurred within 30 days of onset.)[4]

HISTORY OF TYPHOID IN PERSONAL CONTACTS: There was no history of contact within 30 days of onset with persons appearing on the focal lists, or otherwise known to have had typhoid, with the exception of that given under "VISITORS."

VISITORS: Two persons appearing on the focal list visited the A home almost every week, Kate S., aunt of the patient, and Mary C., her housekeeper. Both had typhoid in September, 1918. Both frequently ate meals at the A home.

CONTACT WITH UNREPORTED CASES: None.

SUSPECTED SOURCES: Mrs. Foster A., suspected carrier;[5] Kate S., suspected carrier; Mary C. suspected carrier; polluted drinking water, farm of Jos. R.

Populations.

Washington County.

Town.	Population.	Focal area.
Washington County	59,691	.....
Hancock	972	W-1
Williamsport	1,615	W-2
Funkstown	620	W-2
Sharpsburg	832	W-3
Boonesboro	1,044	W-5
Keedysville	394	W-5
Smithsburg	586	W-7
Clear Spring	538	.....
Hagerstown	28,034	.....

Frederick County.

Town.	Population.	Focal area.
Frederick County	52,541	.....
Middletown	749	F-2
Brunswick	3,905	F-3
Burkittsville	200	F-3
Thurmont	1,074	F-4
Emmitsburg	940	F-4
Point of Rocks	365	F-6
Walkersville	596	F-7
Woodsboro	385	F-7
New Market	274	F-8
Frederick	11,036	.....

SMALLPOX OUTBREAK IN GLASGOW SHOWS EFFICACY OF VACCINATION.

Recent figures indicate an increasing prevalence of smallpox. Within the past five years, epidemics have occurred in Scotland, Germany, France, Spain, Australia, Burma, the Philippines, Mexico, Brazil, Argentina, Chile, Costa Rica, Santo Domingo, Canada, and parts of the United States. Case rates per 1,000 population for certain

[4] On account of time elapsing between their attack and demonstration of carrier No. 10, they were not classified as cases having definite contact with a known carrier within 30 days of onset.

[5] Feces culture showed *B. paratyphosus Beta* (carrier No. 10).